

Amendments to the Specification:

Please replace paragraph [0003] with the following amended paragraph:

[0003] One embodiment of the present invention is a method for ~~adaptively~~-adjusting the amount of liquid added to a dishwasher in one or more liquid fill periods in a dishwasher cycle. The method comprises the steps of activating the dishwasher drain pump to drain liquid from the dishwasher while continuing to operate the dishwasher circulation pump prior to the end of at least one liquid circulation period; accumulating the time from the start of the drain pump operation until ~~said-~~the circulation pump experiences a liquid starvation episode; comparing the accumulated time period with a predetermined optimum time period for the circulation pump to experience liquid starvation; using the difference between the accumulated time period and the predetermined optimum time period to adjust the amount of liquid added in the next liquid fill period; and adding the adjusted amount of liquid during the next liquid fill period.

Please replace paragraph [0004] with the following amended paragraph:

[0004] Another embodiment of the invention is a method for ~~adaptively~~-adjusting the amount of liquid added to a dishwasher in one or more liquid fill periods in one or more dishwasher cycles each including a plurality of liquid fill periods, a plurality of liquid circulation periods and a plurality of liquid drain periods operated by a controller. The method comprises the steps of activating the dishwasher drain pump to drain liquid from the dishwasher while continuing to operate the dishwasher circulation pump near the end of at least one liquid circulation period; monitoring operation of the circulation pump to accumulate a circulation pump starvation period beginning with activation of the drain pump and ending when the circulation pump experiences a liquid starvation episode; comparing the circulation pump starvation period with a predetermined optimum time period for the circulation pump to experience liquid starvation to decrease or increase the amount of liquid added ~~to the adaptive~~in the previous liquid fill period ~~amount of liquid~~ stored in the controller depending on whether the circulation pump starvation period is longer or shorter than the predetermined optimum time period; deactivating the circulation pump after the circulation pump experiences a liquid starvation episode and

~~continue continuing~~ to operate the drain pump to complete draining of the liquid at the end of said liquid circulation period; storing the adjusted ~~adaptive liquid fill period~~ amount of liquid in the controller for the next liquid fill period replacing the previous ~~adaptive liquid fill period~~ amount of liquid; and ~~implementing adding~~ the adjusted ~~adaptive amount of liquid fill period~~ in the next liquid fill period of the dishwasher.

Please delete paragraph [0005].

Please replace paragraph [0026] with the following amended paragraph:

[0026] In operation, controller 25 can initiate a selected dishwasher cycle upon command by a user. A dishwasher cycle can begin with a liquid fill sub-cycle. Those skilled in the art will recognize that a drain sub-cycle can precede an initial liquid fill sub-cycle to assure that excess liquid present in the dishwasher sump 11 is pumped to drain before commencing the selected cycle. Unless the dishwasher use is the first use as described in paragraph [0026] below, controller 25 can apply the adjusted fill amount of liquid stored in the adaptive fill memory, not shown. Following the initial liquid fill sub-cycle controller 25 can initiate a wash or rinse sub-cycle in which the circulation pump 12 is operated by activation of circulation pump motor 13. Near the end of the wash or rinse sub-cycle controller 25 can initiate the adaptive fill adjustment method steps. The adaptive fill adjustment method steps can include activating drain pump motor 19 and thereby drain pump 16 while allowing circulation pump 12 to continue in operation. The microprocessor, not shown, in controller 25 can begin to accumulate time starting with activation of drain pump 16. As drain pump 16 withdraws liquid from sump 11 the amount of liquid remaining in dishwasher tub 10 will be reduced to the point that there will be insufficient liquid available for circulation pump 12 and a liquid starvation episode will occur. Typically in a liquid starvation episode circulation pump 12 will have little or no liquid available to pump so that a combination of air and water is drawn into circulation pump 12. Liquid circulating in tub 10 will fall to sump 11 and sufficient liquid may collect at the inlet to circulation pump 12 to allow circulation pump 12 to resume pumping liquid until another liquid starvation episode occurs.

Please replace paragraph [0030] with the following amended paragraph:

[0030] Any of the variables described in the previous paragraph can cause a liquid starvation episode due to sequestration of liquid by the dish load, aeration or surfactant action. A liquid starvation episode resulting from variables described in the previous paragraph can occur early in a liquid circulation sub-cycle. It will be appreciated by those skilled in the art that sequestration of liquid by a flipped glass or cup can occur at any time, not only at the beginning of a circulation sub-cycle. Controller 25 can include a microprocessor, not shown, running an algorithm to perform the method steps shown in FIG. 2. The algorithm can also include steps to detect circulation pump liquid starvation episodes at times in circulation sub-cycles other than near the end of the circulation sub-cycles when the adaptive fill adjustment occurs. For example, sensor circuit 50 could monitor circulation pump 12 and/or circulation pump motor 13 operating parameters over the circulation sub-cycle by monitoring the maximum and minimum value of the operating parameters over periods sufficiently long for a liquid starvation episode to occur. Controller 25 could infer a liquid starvation episode when the difference between the maximum and minimum values exceeds a predetermined threshold. Controller 25 could be programmed to take action in response to such a liquid starvation episode depending on when the liquid starvation episode occurred in a sub-cycle or the dishwasher cycle. For example, a liquid starvation episode near the beginning of the first liquid circulation sub-cycle could infer protein soil, carryover rinse-aid material, or the presence of hand wash detergent. Possible actions in response to a liquid starvation episode near the beginning of the first circulation sub-cycle can include one or more of adding additional liquid to quell the liquid starvation episodes, shorten the duration of the current circulation sub-cycle, suspend the adaptive fill adjustment and institute a predetermined liquid fill for the next fill sub-cycle (see paragraph [0027] below) and add one or more additional fill, circulation and drain sequences to the dishwasher cycle to purge material such as hand washing detergent causing liquid starvation episodes, particularly if such episodes recur after the addition of liquid to quell such episodes. Sudden recurring starvation episodes during a circulation sub-cycle when a thermal hold is not occurring can infer a flipped cup or glass. Possible actions in response to a flipped cup or glass can include adding additional liquid and suspending the adaptive fill

adjustment for the remainder of the dishwasher cycle. Sudden recurring starvation episodes during a circulation sub-cycle when a thermal hold is occurring can infer aeration due to detergent sudsing during the prolonged thermal hold period. Possible actions in response to liquid starvation episodes during a thermal hold can include aborting the current circulation sub-cycle and suspending the adaptive fill adjustment for the next fill sub-cycle and use the previous base liquid amount for the next fill sub-cycle. A liquid starvation episode during a rinse circulation sub-cycle following addition of rinse-aid material can infer addition of rinse-aid material. In response to a liquid starvation episode in a rinse circulation sub-cycle can be addition of liquid to quell the liquid starvation episodes. In addition, occurrence of a liquid starvation episode in a rinse circulation sub-cycle can trigger addition of an additional liquid amount in the first fill sub-cycle of the next dishwasher cycle to overcome any rinse-aid material carryover.

Please replace paragraph [0034] with the following amended paragraph:

[0034] The adaptive fill control can sense when a rinse-aid dispenser typically provided in dishwashers, not shown, is empty. As described in paragraph [0026] above, presence of rinse-aid material in a circulation sub-cycle can cause a liquid starvation episode due to the action of the surfactant in the rinse-aid material. This can be especially true when the available amount of liquid has been controlled by the adaptive fill control according to the invention. Whether or not a liquid starvation episode occurs, presence of rinse-aid material can be confirmed by monitoring operating parameters of circulation pump 12 and/or circulation pump motor 13. Presence of rinse-aid material in normal concentrations can be detected by a decrease in circulation pump pressure, an increase in circulation pump motor speed, a decrease in circulation pump motor torque, a decrease in circulation pump motor current, an increase in circulation pump motor main winding phase lag, or an increase in circulation pump motor total phase lag, each as compared to when rinse-aid material is not present in the dishwasher liquid. Controller 25 can be arranged to provide a "fill rinse-aid dispenser" signal in response to failure to detect the presence of rinse-aid material in a rinse circulation sub-cycle following activation of the rinse-aid dispenser, not shown, to advise the dishwasher user that the rinse-aid material dispenser is empty. Controller 25 can also be arranged to attempt another addition of

rinse-aid material in the event controller 25 and sensor circuit 50 fails to detect presence of rinse-aid material. Those skilled in the art will recognize that controller 25 can be arranged to both attempt another addition or rinse-aid material, and if no rinse-aid material is detected, provide a "fill rinse-aid dispenser" signal. As described above, when the presence of rinse-aid material is detected and a liquid starvation episode occurs, controller 25 can cause an addition of liquid to quell the liquid starvation episodes.